THE DENTAL PRACTITIONER

AND DENTAL RECORD

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THE DENTAL PRACTITIONER

AND DENTAL RECORD

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THE DENTAL PRACTITIONER AND DENTAL RECORD

Vol. X, No. 9 May, 1960

EDITORIAL

THE HEALTH OF THE DENTIST

THE departure in recent years of the conventional handpiece from exclusive use and the advent of the turbine instruments have created a unique awareness of the health hazards of dental practice.

It has introduced acute new problems with fully unexplored consequences. For instance: when the dentist uses an air turbine he is struck in the face by flying tooth and filling debris, as well as being drenched by a backsplash of water and saliva. His eyes, nasal passages, lungs, mouth, and skin are subjected to a bombardment of oil, bacteria, and grit-laden air and water.

Is this purely uncomfortable? Or is this bombardment actually harmful to the dentist's health?

Discussion and correspondence in recent months indicate the latter. Evidence has come to light of apparent deafness and tinnitis, scratched and infected eyes, nasal infections and lung complaints, boils and carbuncles on the face, and oil allergies of the hands. Some of these reports may well be coincidental, but without doubt their apparent marked increase must be due in some measure to the turbine instruments.

There is a grave implication here. In the view of THE DENTAL PRACTITIONER it becomes even graver because it *is* only an *implication*. After three years of use, why are no facts and figures yet generally available on the air turbine's performance relative to the operator? If it is harmless—then we should know. But if—as evidence indicates—the bacteria-laden backsplash *can* cause trouble, then we should also know. And know what to do about it.

At present, every practitioner must seemingly provide his own salvation.*

Research is undoubtedly under way; but is it not time some results were published? Even an interim report, clarifying only part of the problem, would be preferable to the fog of conjecture and implication in which the dentist must grope at present.

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* *Suggested protective measures that the dentist using air turbine instruments may employ*:—

Spectacles—plain glass or otherwise.

Mask—celluloid or treble-thickness cotton.

Ear plugs or muffs (or a change of machine if the operator is subject to a feeling of malaise).

Avoidance of precarcinogenic non-absorbable, non-vegetable oils as lubricants.

Frequent cleansing of the skin of the face and neck.

A "STOP" TECHNIQUE FOR FULL DENTURE IMPRESSIONS

By **A. J. W. TURRELL**, L.D.S.
The Charles Clifford Dental Hospital, Sheffield

So many impression techniques have been offered to the profession that one feels compelled to offer an apology for suggesting another. The writer has been encouraged to do so because of the excellent results obtained over the past six years in the Prosthetic Department, at the Dental Hospital in Sheffield, where the technique to be described has been in daily use by students and staff.

A SHORT REVIEW OF IMPRESSION TECHNIQUES

Most of the techniques for taking impressions of the edentulous mouth in this country may be considered as variations of three main techniques: One method consists of using stock trays only; in the second method special trays are employed; and in the third, additions of tracing-stick compound are made to an initial impression in compound, a technique developed by the Green brothers in 1890.

It is a regrettable fact that the use of stock trays alone is a common practice in this country outside the teaching schools. *No doubt this is because the method requires only one visit at the impression stage.* Dentures constructed on the models cast from such impressions invariably possess over-extended flanges because the flanges of most stock trays are too deep. The time gained at the impression stage is lost by the frequent visits of the patient for adjustments. Some dentists use alginate, or controlled plaster-of-Paris, as the impression material, whereas others prefer impression compound, either by itself or with a corrective "wash" of plaster, alginate, or occasionally zinc oxide–eugenol paste. The "wash" impression will give more accurate results than the use of the materials in bulk because it is more uniform in thickness.

Those who construct special trays often do so on models cast from initial impressions obtained in the same manner as described above. The flanges of these special trays have to be adjusted to the correct depth at the chair-side before taking the final impressions. The degree of accuracy is dependent upon two factors: first, the ability of the operator to estimate that the periphery of the tray is approximately $\frac{1}{16}$ in. clear of the sulci, which permits the impression material to extend beyond the edge of the tray into the sulci; and secondly, when seating the impression, his ability to stop the tray so that the periphery is again $\frac{1}{16}$ in. short of the sulci. If, on inserting the impression, the tray is seated too close to the ridge, the edges of the tray will now be over-extended and the sulci will be distorted, so that the flanges of the future denture will not only be over-extended but they will not conform accurately to the tissues of the sulci. The tray will also show through the impression material should it contact the ridge. Insufficient pressure on the tray will produce an accurate impression of the sulci by the unsupported alginate, but being unsupported for more than $\frac{1}{16}$ in., it will be displaced outwards when the impression is cast. This outward displacement will occur irrespective of the care taken in casting or the method employed. If controlled plaster-of-Paris is the material used instead of alginate, this discrepancy will not occur because of its rigidity.

Of the three methods stated above, that which employs tracing-stick additions to the reduced flanges of a compound impression followed by a corrective "wash" probably produces the most accurate impression of the sulci, when skilfully applied. Unfortunately, this method is time-consuming, requires a high degree of skill and experience, and restricts one, to some extent, to muco-compression.

The object of the technique to be described is to produce, first, an impression of the undistorted sulci which will permit the accurate

positioning of the periphery of the special tray by the technician—$\frac{1}{16}$ in. short of the sulci—and secondly, to provide a means whereby the seating of the special tray, when taking the impression, is stopped so that the periphery is again $\frac{1}{16}$ in. from the sulci.

THE UPPER IMPRESSION

The Initial Compound Impression of the Upper Denture-bearing Area.—A stock tray is selected which will fulfil the usual requirements but emphasis must be laid on the depth of the buccal and labial flanges. These *must* be at least $\frac{1}{4}$ in. to $\frac{1}{8}$ in. short of the periphery, which necessitates cutting down the flanges of most stock trays.

An impression is taken in impression compound and removed from the mouth. The flanges are then trimmed right down to the periphery of the tray.

Excess compound extending on to the soft palate is also removed. A notch cut into the labial flange relative to the labial frænum will aid in re-seating the impression in the mouth correctly, for the next stage is the covering of the impression with a "wash" of alginate.

The Alginate Wash.—A rolled dental napkin is packed into the upper sulcus to keep it dry. A thin layer of alginate is then placed on the compound, which should be dry, the napkin is removed, the dried sulcus packed to the level of the residual ridge with alginate, and the alginate-covered compound impression is then placed in the mouth with sufficient pressure to encourage the alginate to flow. The lips and cheeks are gently manipulated to promote the flow of excess alginate and prevent the trapping of air. The difficulty of packing alginate into a wet sulcus will be realized—hence the use of the napkin. Providing the compound is dry there is no need for scoring to retain the alginate.

Many alginate impression materials now on the market are not only too viscous for use as a "wash", but also they set too quickly to permit packing into the sulci and inserting the tray. The setting time can be increased and the viscosity reduced by adding less powder to the water than is recommended by the manufacturer. Naturally, the mix must never be diluted for the final impression in the special tray, as the properties of the material will be adversely affected by the reduction in powder content (Skinner, 1954). Such inaccuracy is of no consequence in the initial impression, for the model is to be covered with two layers of wax to form a "spacer" on which the special tray is constructed.

The Special Tray Impression.—The material used for the construction of the tray may be shellac base-plate or methyl-methacrylate resin.

It is the writer's view that no technique will produce a more accurate impression of the undistorted sulci than unsupported alginate or plaster-of-Paris, providing a gross excess of either material is not packed into the sulci. With the technique described for the initial impression, it is possible for the technician to adjust the periphery of the tray very closely to the desired position of $\frac{1}{16}$ in. from the sulci. In addition all fræna are clearly defined and they can be relieved accurately.

When seating an impression in a special tray by the usual methods the operator has to rely upon his judgement as to when the periphery of the tray is $\frac{1}{16}$ in. short of the sulci. It is only when the tray is thus positioned that the alginate will extend beyond the periphery of the tray to flow into the sulci, and so produce an undistorted impression of the latter in the position it occupies for that particular degree of mouth opening at which the impression is taken. The inaccuracies resulting at the periphery when his judgement is in error have been mentioned above; in addition the likelihood of producing an impression of uniform thickness is remote. Ideally, the thickness of the impression throughout should be that of the two layers of spacer-wax. The writer considers he is approaching this ideal very closely by placing "stops" of impression compound in the tray equal in thickness to the spacer-wax, which will stop the upward movement of the tray a distance equal to the spacer-wax.

Adjusting the "Stops".—*Fig.* 1 shows a strip of wax cut from the posterior dam region

and also sections cut out from the first premolar regions. A roll of softened impression compound is adjusted to the posterior edge of the tray which is then seated firmly on to the

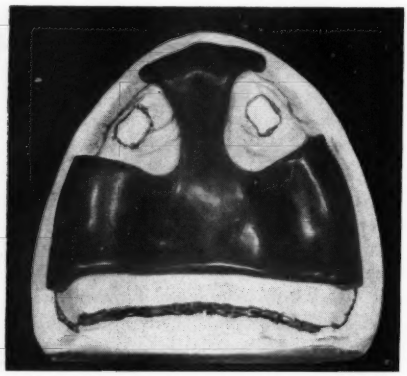

Fig. 1.—Shows the upper model with the spacer-wax cut clear from the canine-premolar regions and the posterior dam region. Note the outline for the "stops" and the position of the posterior dam.

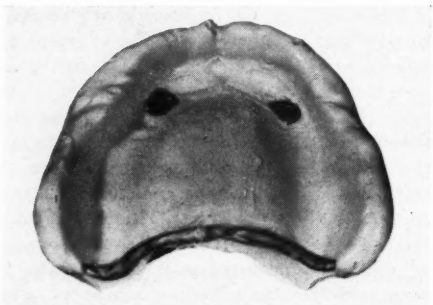

Fig. 3.—Shows the completed alginate impression. Note the "stops" and posterior dam showing through the impression. The thickness of this impression is equal throughout to the thickness of the spacer-wax except at the periphery.

model with the spacer-wax in situ. On removal, excess compound is trimmed away to produce a dam of approximately $\frac{1}{8}$ in. in width. Two small balls of softened compound are then placed on the model where the spacer-wax has been cut away in the first premolar regions, a little molten "sticky-wax" is dropped on to each, and the tray is again seated firmly into position on the model with spacer-wax in position. On removing the tray the compound balls—the "stops"—will be attached firmly to it. These "stops" are then reduced to a square of sides $\frac{3}{16}$ in.

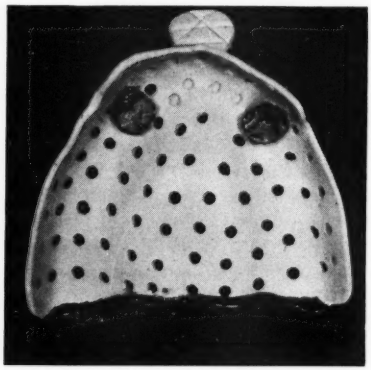

Fig. 2.—Shows the upper special tray with the impression surface upwards. Note the compound "stops" and posterior dam exactly equal in thickness to the spacer-wax. For application of the "stops" and dam, *see text.*

approximately, the size being dependent upon the width of the ridge (*Fig.* 2).

It is advisable to remove the spacer-wax and seat the tray on the model, when it will be seen that it is held off an amount equal to the thickness of the two layers of wax.

When the tray is held with the fingers placed between the anterior stops and the posterior dam on each side it should be stable. It will now follow that if the alginate-loaded tray is placed in the mouth firmly, with the fingers positioned as described, the "stops" on contacting the ridge will resist the further upward movement of the tray which will now be seated correctly.

Once the tray has been seated it should be held with just sufficient pressure to prevent dislodgement should the patient make any sudden movement. If excessive pressure is maintained the "stops" will compress the tissues, which will cause depressions on the model cast from it and corresponding projections on the finished denture. Should this occur, the latter can be carefully ground down with little detriment to fit because of the

relatively small areas involved. *Fig.* 3 shows the completed impression with the "stops" and posterior dam clearly defined.

Until the operator learns to recognize the resistance caused by the "stops" contacting the ridge, he will produce impressions where the "stops" fail to show through or where one stop only is visible, indicating that the hands are not exerting equal pressure. With practice these errors can be rectified.

THE LOWER IMPRESSION

The Initial Compound Impression of the Lower Denture-bearing Area.—As with the upper stock trays, the flanges of most lower stock trays are far too deep even when the ridges are well formed. The writer has found that two lower trays are suitable for most mouths—the Casco 6 and 7 trays. As with the upper tray it is essential that the flanges should be short of the sulci when the tray is in position over the ridge. It should also be of sufficient length to cover the retromolar pads.

An impression in compound is taken, using a stock tray. The impression of the buccal and labial flanges is cut away to the edge of the tray so as to leave the sulci entirely free of impression compound. The lingual flanges are treated similarly, although a little extra depth may be retained in the posterior regions. The depth and length of these posterior lingual flanges are the most difficult regions to record on the impression correctly.

Fig. 4, *left*, shows the correct length and depth of the lingual flanges. On the right is an impression of the same mouth showing the short indefinite lingual flanges which are usually accepted as being correct. Tracing-stick compound is applied to one side, the impression reseated, and the patient instructed to moisten the upper lip with the tongue, then to place the tongue into the buccal sulci in turn on the opposite side to the flange under treatment. It will be realized that these tongue movements bring the palato-glossal arch, the mandibular slip of the superior constrictor, and the floor of the mouth into the position they assume during function (MacMillan, 1936), when moistening the lips during conversation and cleaning the lips and sulci of food debris during meals. Additions are made to the flanges with the tracing-stick compound until they are seen to be curved medially by the impinging palato-glossal arch. This establishes the length of the flange. There is some danger of having too great a depth to this flange because of the lack of muscular tissue immediately to the posterior border of the mylohyoid muscle, which occasionally forms a notch in the impression, but if the tracing-stick is well softened and the tongue placed repeatedly in the buccal sulci, it will be seen to assume a clearly defined form eventually. The other posterior lingual flange is adapted in the same manner.

It is advisable to examine these flanges from the posterior aspect before applying a wash of alginate, which is the next stage. Often it will be observed that a considerable undercut has been formed should the compound have flowed under the mylohyoid ridges. The compound should be cut away on the impression surface to remove this undercut, for the alginate wash is invariably wiped off as the compound forming the undercut passes over the mylohyoid ridges. Naturally, care must be exercised not to reduce or deform the depth of the flanges. Before the alginate-covered compound impression is reseated in the mouth, an attempt should be made to place a little alginate into these posterior flange regions—the retromylohyoid regions—with a narrow wooden or metal spatula. A wide powerful tongue will often make this impossible and one has to rely upon having sufficient excess alginate on the compound impression to replace the compound cut away to relieve the undercut.

There is no need to pre-pack the remaining sulci with alginate before inserting the tray, for the "wash" will flow readily into the sulci providing excess has been added. As soon as the impression has been seated, the patient is instructed to repeat the tongue movements described above, and in addition the tongue should be raised to the roof of the mouth so as to trim the anterior lingual flange. The operator gently displaces the cheeks and lips outwards, downwards, and upwards. During

gelation *the tongue must be held with the tip contacting the upper lip* so as to prevent the alginate from flowing beyond the compound impression. Should this occur, the impression will record the rest positions of the palatoglossal arch, the superior constrictor, and the floor of the mouth, and not the desired functional positions. *Fig.* 5 shows the alginate washes applied to the compound impressions of *Fig.* 4. Again, comparison should be made of the fully extended lingual flanges on the left and the short flanges on the right.

A special tray has now to be constructed on the model cast from this impression.

The Special Tray Impression.—

Constructing the Special Tray.—The usual two layers of modelling wax are adapted to the model cast from the initial impression and a tray in shellac base-plate or resin is constructed over it, adjusting the periphery of the tray $\frac{1}{16}$ in. short of the sulci.

Adjusting the "Stops".—The downward movement of the alginate-loaded tray has to be arrested from the ridge a distance equal to the two layers of spacer-wax in order to relate the periphery of the tray $\frac{1}{16}$ in. short of the sulci. *Figs.* 6 and 7 illustrate clearly the mode of application, size, and position of the "stops". *Fig.* 8 shows the tray held off the model by the stops an amount equal to the two layers of spacer-wax.

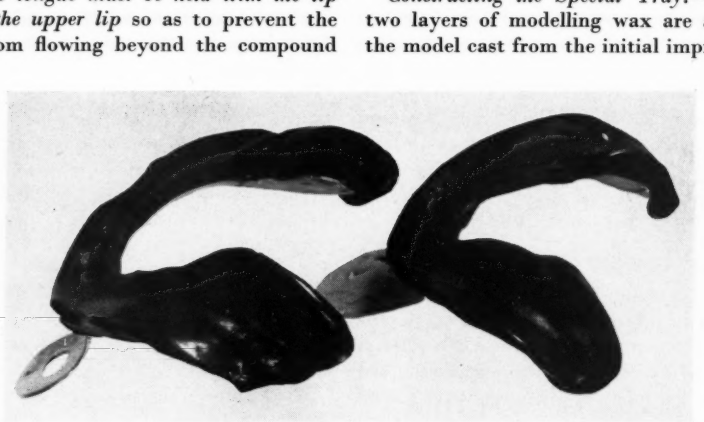

Fig. 4.—Two initial compound impressions taken of the same mouth in the same-sized tray. That on the *left* shows the full functional length of the lingual flanges. That on the *right* shows the length of the lingual flanges which are usually accepted as being correct.

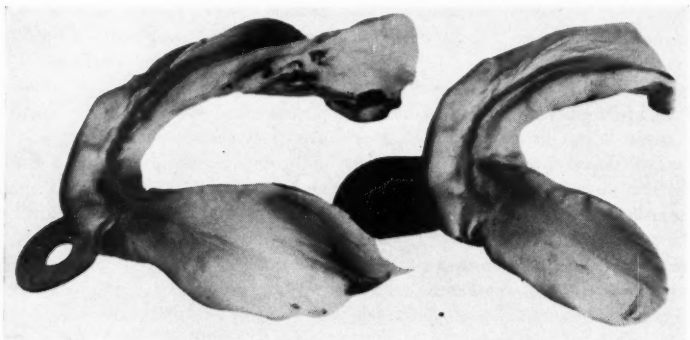

Fig. 5.—On the *left* the completed initial impression, which has an alginate wash applied to the compound impression shown in *Fig.* 4. Again compare the length of the lingual flanges with those on the *right*.

Before inserting the alginate-loaded tray, it is advisable to insert, whenever possible, a little alginate in the retromylohyoid region, as before. The tongue movements are executed by the patient and the operator gently displaces the cheeks and lower lip outwards, downwards, and upwards. *Fig.* 9 shows the completed impression.

It must be pointed out that although alginate has been used in describing both the initial and final impressions for the upper and lower, controlled plaster can be used with equal success. Pendleton (1942) used a similar compound-plaster wash technique as a final impression.

Fig. 10 shows a section of the model with the patient's original denture placed on it.

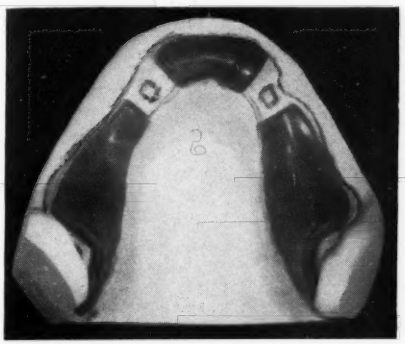

Fig. 6.—Shows the lower model cast from the impression shown in *Fig.* 5. Note the spacer-wax cut clear from the canine-premolar regions and from each retromolar pad region. The "stops" are outlined in pencil.

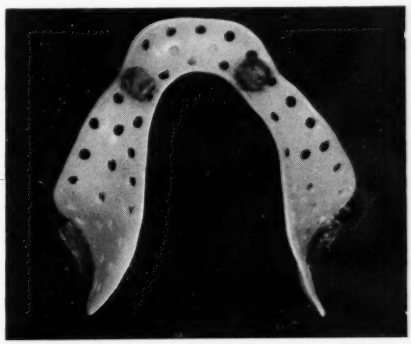

Fig. 7.—The lower special tray with anterior and posterior compound "stops" equal in thickness to the spacer-wax.

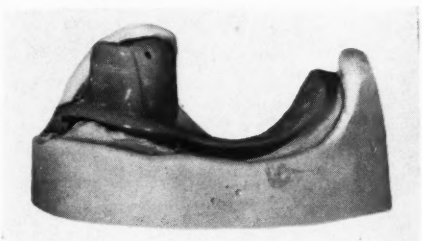

Fig. 8.—Shows the lower special tray held off the model a distance equal to the two layers of spacer-wax by the compound "stops". The spacer-wax has been removed.

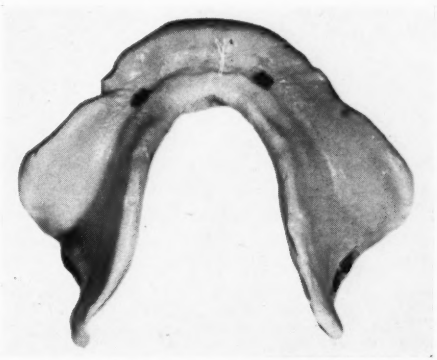

Fig. 9.—Shows the completed lower impression taken in the special tray. Note the compound "stops" anteriorly and posteriorly showing through the alginate. The thickness of the impression throughout is equivalent to the two layers of spacer-wax.

Fig. 10.—Shows the patient's original denture on the model cast from the new impression. The pencilled outline indicates the areas usually neglected which, when utilized, add considerably to stability.

It will be obvious that extension on to the retromolar pads, which sometimes are near-vertical, will help to resist anteroposterior displacing forces, and extension on to the retromylohyoid regions will help to resist lateral displacing forces (Fournet and Tuller, 1936). Many dentists fail to utilize these areas which are of especial value when the ridge is resorbed excessively. Naturally, the size of the flanges which can be tolerated under these conditions will be influenced by the degree of resorption, but even a small extension improves stability.

Summary of the Value of the Technique.—The following advantages are claimed for the technique described:—

1. An accurate impression of the undistorted sulci is accomplished, requiring less time and less skill than the tracing-stick methods.

2. A uniform thickness of impression material is assured, which, theoretically, should produce a more accurate impression because any strains will be induced more uniformly.

3. For the adherents to the so-called "mucostatic school" this technique affords the minimum tissue displacement apart from the regions of the "stops" because the tray is supported in four regions only, and because the holes in the tray will reduce resistance to the flow of the impression material.

4. The lower impression can be held firmly in position, reducing the risk of displacement when the lingual flanges are being moulded by the tongue movements.

5. The technique reduces the visits of patients returning for reduction of over-extended flanges.

Contra-indications for the Technique.—The writer never uses this technique when flabby tissues are present in the regions where the anterior "stops" have to be placed because the tissues could not support the pressure from the stops on inserting the tray.

Even when the pressure is released after the tray has been seated, very soft tissues are not sufficiently resilient to re-establish their resting position. The retromolar pads, although soft, are usually able to assume, or nearly so, their resting position. Obviously, if the tissues are too soft to resist the "stops" the tray will be carried too close to the ridges and the periphery too close to the sulci—nothing would be gained by the "stop" technique. In the upper, a single larger anterior stop can occasionally be placed in the midline of the palate anteriorly when the premolar regions are flabby.

The Technique applied to Relining Dentures.—Until the adoption of the "stop" technique to relining dentures the writer had many disappointments. When relining the dentures, it is usual to remove all undercuts by trimming away the resin from the tissue surface of the flanges, and reducing them $\frac{1}{16}$ in. in depth should they be correct, or adding to them with tracing-stick should they be too shallow. The dried resin is then covered with a layer of zinc oxide–eugenol impression paste and the denture is inserted, followed by the opposing denture. The patient is directed into centric occlusion and pressure is maintained until the paste has set.

This technique is usually successful for the lower denture, especially when a fair degree of resorption has occurred, for there is space for the paste. With the upper denture, however, resorption occurs mainly on the ridge, very little occurring in the palate, and consequently it is not always possible for the denture to be correctly seated no matter how thin the layer of paste may be. This results in an inaccurate occlusion, a thickened palate, and the anterior teeth being lower and more anteriorly placed than before.

The writer overcomes these disadvantages by drawing in pencil on the tissue surface of the denture a rectangle of sides approximately $\frac{3}{16}$ in. $\times$ $\frac{1}{16}$ in. on the ridge-crest extending slightly on to the buccal plate in each first premolar region. A similar strip is also drawn in the midline which extends on to the labial plate. A small quantity of impression compound is heated on a wax-knife and carried to each outlined "stop".

The denture is then replaced in the mouth and the patient directed to close in centric occlusion firmly. The compound should compensate for the resorption of the ridge. Finally,

a layer of resin is removed with a large ball-shaped "vulcanite" bur from the entire fitting surface, obviously excluding the posterior dam and the areas under the compound "stops". When the fitting surface has been covered with a layer of impression paste, the denture is inserted very firmly with an upward and backward pressure. The anterior stop should locate the correct antero-posterior position of the denture and the premolar stops the correct lateral relationship. The patient then closes in centric occlusion.

When the paste has set, a model is cast into the denture, excess paste trimmed away with care from the flanges, and the denture is now ready for flasking, packing, and processing in the usual manner.

The lower denture can be treated similarly, placing the posterior "stops" on the retromolar pads and the anterior "stops" as for the upper reline technique.

SUMMARY

Three impression techniques in current use in this country are stated in brief.

A method of obtaining initial impressions of the edentulous mouth to produce minimum distortion of the sulci by the use of unsupported alginate impression material or controlled plaster is described.

A technique is described whereby the special trays constructed on the models cast from the initial impressions are "stopped" at a uniform distance from the ridges equivalent to the thickness of the spacer-wax over which the trays are constructed. This is a quick simple method which reduces the distortion of the sulci to a minimum and produces an impression which approximates very closely to uniform thickness.

The contra-indications for the technique are stated.

The technique is applied to relining dentures by the conventional closed-mouth technique using zinc oxide–eugenol impression paste.

Space is created for the paste, maintaining the correct relationship of the teeth, especially the anterior teeth, the thickness of the palate, and the vertical dimension.

Acknowledgements.—I am grateful to Mr. Cousins, of the Photographic Department, the Charles Clifford Dental Hospital, Sheffield, for the illustrations.

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Histogenesis of the Gingival Sulcus Epithelium in the Rat

A careful histological survey of the relation between oral epithelium and reduced enamel epithelium of the rat during eruption of the tooth is reported.

It was found that the oral mucosa degenerates spontaneously to permit emergence of the tooth.

Ameloblasts persist on the occlusal surface of the tooth until emergence. Neither the primary nor the secondary cuticles were established on a histologic basis.

The epithelium of the gingival crevice arises from the oral mucosa and the odontogenic epithelium, the latter changing from the form of ameloblasts to squamous cells.

The outer enamel and stellate reticulum make no contribution to the formation of the sulcus epithelium. The oral epithelium extends apically behind the occlusal part of the odontogenic epithelium which forms the fundal half of the sulcus epithelium.

Apical migration occurs at growth centres in the fundi of both odontogenic and oral epithelia.

It is concluded that no evidence of epithelial attachment to enamel can be established by histological examinations, and that the apical limit of the gingival crevice can only be established histologically when there is separation of the epithelium from cementum. —UOHARA, G. I. (1959), *J. Periodont.*, **30**, 326.

THE USE OF PRE-EXTRACTION RADIOGRAPHS IN THE MANAGEMENT OF DIFFICULT EXTRACTIONS

By **GEOFFREY L. HOWE**, F.D.S. R.C.S. (Eng.), L.R.C.P. (Lond.), M.R.C.S. (Eng.)
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TEETH may prove difficult to extract for a variety of reasons, and the dental surgeon should always be on the alert for any warning that a particular extraction may be a difficult one. No extraction should ever be attempted unless the anæsthesia and arrangements are such that it can be successfully accomplished. The experienced dental surgeon knows that the grossly carious lower molar, set in alveolar bone with a convex outer surface, will usually prove difficult to remove, especially if the patient is a square-jawed individual. Yet the removal of such teeth is usually attempted with forceps without any guarantee of success. The results of this practice are underlined by the work of Storer (1957), who found during a radiographic survey of 500 "edentulous" patients, who exhibited no clinical signs of pathology, that 147 (29·4 per cent) had retained roots or apices and that positive findings of some kind were present in 186 (37·2 per cent) of the patients. If it is suspected that an extraction may prove difficult, an attempt should be made to diagnose the difficulties and possible complications. A plan of campaign designed to deal with the difficulties and avoid the complications should then be formulated and only put into operation when the facilities required for its successful completion are available.

Fig. 1.—The extraction of this hypercementosed lower molar had been unsuccessfully attempted with forceps. The retained root is evidence of previous difficulty with extractions.

Fig. 2.—This mandibular first molar proved resistant to forceps extraction. A radiograph revealed the presence of three roots.

PRE-OPERATIVE ASSESSMENT

A history of general disease, nervousness, resistance to nitrous oxide anæsthesia, or previous difficulty with extractions will govern both the choice of anæsthesia and the method utilized to deliver the tooth. Whilst the history is being taken, a general impression of the patient is formed and the size of his mouth and jaws noted. Painstaking clinical examination of the tooth to be extracted and its supporting structures always yields valuable information. The tooth may be heavily restored or grossly carious, inclined or rotated, firm or mobile, whilst the supporting structures may be either diseased or hypertrophied. In many cases, diagnosis of the difficulties and possible complications is only practicable if the clinical examination is supplemented by a pre-extraction radiograph.

Indications for a Pre-extraction Radiograph.—It is not usually found possible to take a

Fig. 3.—It was decided to remove this broken-down non-vital mandibular first molar by dissection. A pre-extraction radiograph revealed its unfavourable root pattern.

Fig. 4.—A maxillary first permanent molar with widely-splayed roots in intimate relationship with the maxillary antrum.

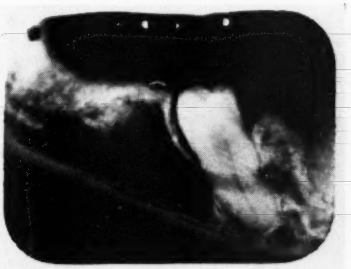

Fig. 5.—The root of this unerupted mandibular second premolar is grooved by the inferior dental nerve and close to the mental foramen.

Fig. 6.—A four-rooted mandibular third molar which resisted forceps extraction.

Fig. 7.—A heavily restored and carious mandibular molar.

Fig. 8.—An isolated mandibular molar affected by periodontal disease with sclerosis of bone and hypercementosis of roots.

pre-operative radiograph prior to every extraction, but one should be taken if any of the following positive indications exist:—

1. A history of difficult or attempted extractions (*Fig.* 1).

2. A tooth which is abnormally resistant to extraction with forceps (*Figs.* 2, 6, and 14).

3. If after clinical examination it has been decided to remove a tooth by dissection (*Fig.* 3).

4. Any teeth or roots in close relationship to either the maxillary antrum or the inferior dental and mental nerves (*Figs.* 4 and 5).

Fig. 9.—A mandibular incisor in the line of an undisplaced fracture of the mandible.

Fig. 10.—An incisor, the root of which had been fractured many years prior to the taking of this radiograph. The pulp chamber and canal are obliterated and the apical portion separated from the remainder of the root by a bony barrier.

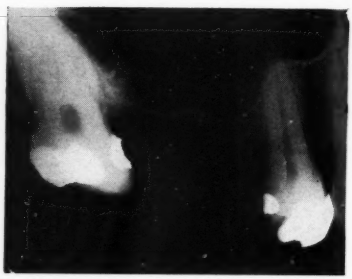

Fig. 11.—An isolated maxillary molar, the bony support of which is weakened by an extension of the maxillary antrum.

Fig. 12.—A partially erupted mandibular third molar with hypercementosed roots. The first molar is heavily restored, non-vital, and its distal root is resorbed.

Fig. 13.—A gemination in the maxillary incisor region.

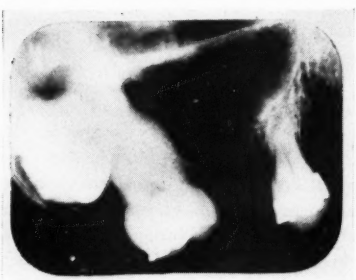

Fig. 14.—A pathological gemination between an unerupted maxillary third molar and an isolated maxillary second molar. Note the large antrum.

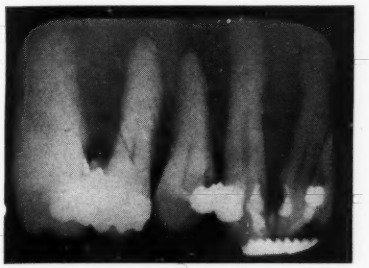

Fig. 15.—Generalized hypercementosis in osteitis deformans (Paget's disease of bone).

Fig. 16.—An ankylosed maxillary molar in a patient with osteitis deformans.

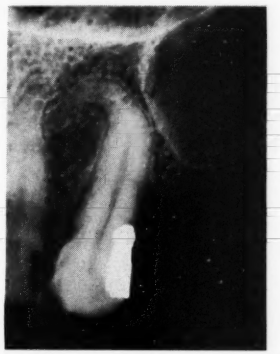

Fig. 17.—A maxillary canine with a hooked root in close relationship to the maxillary antrum.

Fig. 18.—A mandibular molar with widely splayed roots.

Fig. 19.—A replanted maxillary central incisor showing marked resorption of the root.

5. All mandibular third molars, instanding premolars, or misplaced canines (*Fig.* 6). The root-pattern of such teeth is often abnormal.

6. Heavily restored or non-vital teeth. These teeth are normally very brittle (*Figs.* 7 and 12).

7. Any tooth affected by periodontal disease accompanied by some sclerosis of the supporting bone. Such teeth are often hypercementosed and brittle (*Fig.* 8).

8. Any tooth subjected to trauma. Fractures of the roots and/or alveolus may be present (*Figs.* 9 and 10).

9. Any isolated maxillary molar, especially if it is over-erupted (*Figs.* 11 and 14). The bony support of such teeth is often weakened by an extension of the maxillary antrum into it. This may predispose to the creation of an oro-antral fistula or fracture of the maxillary tuberosity.

10. Any partially erupted or unerupted tooth (*Fig.* 12).

11. Any tooth whose abnormal crown or delayed eruption might indicate the possibility of dilaceration, gemination, or a dilated odontome (*Figs.* 13 and 14).

12. Any condition which predisposes to dental or alveolar abnormality, e.g.:—

a. Osteitis deformans, in which roots are hypercementosed and there is a predisposition to chronic osteomyelitis (*Figs.* 15 and 16).

Fig. 20.—Localized hypercementosis.

Fig. 22.—An ankylosed maxillary first premolar.

b. Cleido-cranial dysostosis. Pseudo-anodontia and hooked roots occur in this condition.

c. Patients who have received therapeutic irradiation to the jaws which predisposes to osteo-radio-necrosis.

d. Osteopetrosis. Difficult extractions and a predisposition to chronic osteomyelitis.

Radiographic Views Required.—A pre-extraction radiograph must show the whole root structure and its investing alveolus. In most cases an intra-oral periapical view will suffice, but sometimes an extra-oral lateral oblique view of the mandible will be required to demonstrate the entire root or the state, structure, and amount of supporting bone. Two radiographs taken at right angles to each other greatly assist the localization of buried teeth and roots. In these cases, an occlusal film is taken in addition to the periapical view and the tooth or root located in relationship to adjacent anatomical structures or a radio-opaque marker.

Fig. 21.—Idiopathic generalized hypercementosis.

Fig. 23.—The lower right second molar was resistant to forceps extraction and was decoronated. This radiograph reveals that an unerupted mandibular third molar was impacted into the tooth.

Interpretation of the Pre-extraction Radiograph.—A good radiograph is wasted unless it is carefully interpreted. The use of a hand-lens and viewing box greatly aid interpretation and enable the following *factors causing difficulty* to be detected:—

1. Abnormal number of roots (*Figs.* 2 and 6).
2. Abnormal shape of roots (*Fig.* 17).
3. An unfavourable root pattern (*Figs.* 1, 3, and 18).
4. Caries extending into the root or root mass (*Fig.* 7).

5. Fracture or resorption of the root (*Figs.* 10 and 19).

6. Hypercementosis of roots (*Figs.* 1, 8, 12, 15, 16, 20, and 21).

7. Ankylosis (*Figs.* 16 and 22).

8. Geminations (*Figs.* 13 and 14).

9. Impacted teeth (*Fig.* 23).

10. Bony sclerosis and pathology (*Fig.* 24). Whilst it is easy to diagnose areas of localized bony sclerosis (*Fig.* 25) on a radiograph, an

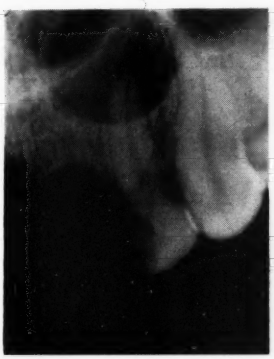

Fig. 24.—Periapical pathological lesions may be retained when the tooth is extracted unless diagnosed pre-operatively. This dental cyst was discovered by radiography in a patient who had received dental treatment regularly for many years.

accurate assessment of generalized bony sclerosis is only possible if both exposure and developing technique are carefully standardized. A less accurate, though useful, guide is based upon the size of the cancellous bone spaces shown in the radiograph. Large spaces are usually found in elastic-yielding bone (*Figs.* 4, 17, 18, and 23), whilst small spaces surrounded by thick radio-opaque trabeculæ characterize sclerotic bone (*Figs.* 3, 19, and 22).

Interpretation of the radiograph may also reveal the possibility of the following complications:—

1. Involvement of and damage to the inferior dental and mental nerves (*Fig.* 5).

2. The creation of an oro-antral or oro-nasal fistula (*Figs.* 4 and 11).

3. The retention of intra-bony pathology (*Fig.* 24).

4. The displacement of a tooth or root into either the maxillary antrum or lingual pouch (Howe, 1958) (*Figs.* 4 and 11).

5. Fracture of the maxillary tuberosity (*Figs.* 11 and 14).

Once the difficulties and possible complications have been diagnosed, a plan of campaign to cope with them can be formulated. Most difficult extractions are best performed by dissecting the tooth from its investing structure—the so-called "surgical" or "open" method of extraction. The precision of this technique renders delivery of the tooth (with

Fig. 25.—Localized bony sclerosis of unknown aetiology.

minimal trauma) a certainty, if undertaken under ideal conditions. Whatever the method used to remove the tooth or root, time spent in pre-operative assessment is always amply repaid and a pre-extraction radiograph is an essential aid to pre-operative assessment.

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TAURODONTISM ASSOCIATED WITH OTHER DENTAL ABNORMALITIES

By **P. J. STOY**, B.D.S., F.D.S. R.C.S.
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THE general dental practitioner in his surgery may have opportunities of clinical research that are denied the laboratory worker. The following discussion, for example, is based on the radiological findings of two patients who presented for reasons quite unconnected with the condition described, i.e., "taurodontism", and it is likely that many patients with similar teeth are being treated daily without the condition being appreciated. The importance of recognizing these taurodont variations lies in the light they may throw on the morphological evolution of our teeth.

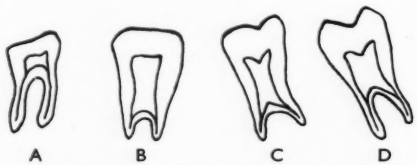

Fig. 1.—A, Outline of molar of modern man; B, Outline of molar of Krapina man; C, Outline of molar from *Case* 1; D, Outline of molar from *Case* 2.

The molar tooth of modern man usually possesses a shallow crown separated from longish roots by a linear constriction or neck (*Fig.* 1 A). Occasionally this arrangement is disturbed, and instead one finds a tendency on the part of the pulp cavity to extend deeply into the region of the roots, so that the body of the tooth becomes enlarged at the expense of the roots—this tendency may be so marked that the roots have almost disappeared (*Fig.* 1 B) and the tooth becomes the kind of tooth that is found in an ungulate, such as the ox. For this reason Sir Arthur Keith, in 1913, suggested for it the descriptive term of "taurodontism" (Latin, *taurus*=a bull). The opposite condition (seen in the teeth of carnivores) where the crown lies above the alveolar border, he called cynodont (Greek, *κύων*=a dog) and is the usual molar type.

The taurodont form of tooth is not found in man's early ancestry, but it is present in certain prehistoric men, e.g., Krapina man, so that its appearance at this stage of evolution causes it to be regarded by anthropologists either as a specialized form or as a retrograde process—but not a primitive feature. Thus, it was the degree of taurodontism found in Neanderthal man that caused Adhoff (1910) to exclude him from the direct ancestry of modern man with his typical cynodont dentition—for teeth would not evolve from a cynodont to a taurodont and then back to a cynodont form.

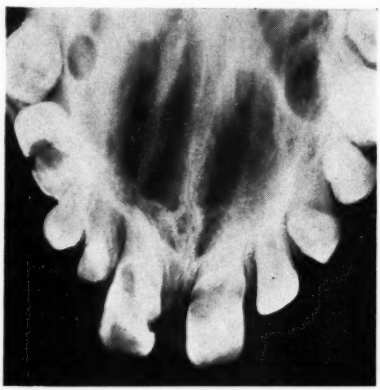

Fig. 2.—*Case* 1. Anterior occlusal film.

Keith (1913) suggested that taurodontism was a specialized form, considering it as being a modification correlated with the nature of the diet—a root or vegetable diet requiring greater grinding power; and Widdowson (1939) states that the large pulp chambers, and consequently the large pulps, prevented teeth exposed to attrition caused by coarse diet from becoming rapidly functionless, "secondary dentine being formed over the pulp surfaces as a protection from the oncoming irritation".

In contrast to taurodontism being considered a specialized development possessing the above advantages, one must consider evidence

for its being a retrograde process, and the two cases now described provide such evidence, as, in both, the taurodontism is associated with other marked anomalies of the dentition that can only be looked upon as degenerative.

CASE REPORTS

Case 1.—I. F., female, aged 10. Referred for advice on the upper front teeth which were markedly proclinated. There was a history of delayed exfoliation of the upper deciduous incisors and this was blamed for the labial displacement of the permanent successors.

On examination, the following teeth were found to be present:—

$$\frac{6ED\ B1|123\ 56}{654321|1234E6}$$

$\underline{1}|\underline{1}$ were markedly proclinated.

Radiographic Findings.—An anterior occlusal film (*Fig.* 2) showed:—

1. $\underline{1}|\underline{1}$ to have the appearance of elongated crowns and short roots—the appearance being complicated by the presence of cervical caries and the proclination of the teeth.
2. $|\underline{23}$ to be small and spaced.
3. $\underline{2}|$ to be very small; the tooth may represent the $\underline{B}|$, and the $\underline{2}|$ congenitally absent.
4. $\underline{3}|$ to be very small also, but unlikely to be a deciduous tooth as there is no marked constriction at the neck and the root as shown in the lateral jaw film is long.

Lateral jaw films (*Fig.* 3) showed:—

5. $\underline{D}|$ to have an elongated crown with only a small projection representing the distal root; the appearance is decidedly "taurodontic".
6. $\underline{E}|$ to be within normal limits.
7. $\overline{6}|\overline{6}$ to exhibit very marked taurodont characteristics with a long body and very short roots (the body being defined by Middleton Shaw (1928) as "that portion of multi-rooted teeth as lying between the lower edge of the enamel and the beginning of the groove which marks the bifurcation of the roots"). It will be noted, however, that the overall length of these two teeth corresponds to that of an average molar—the lengthening of the body being compensated for by the shortening of the roots. (*Fig.* 1 C.)
8. $\overline{7}|$ to exhibit a lesser degree of taurodontism; $|\overline{7}$ to be within normal limits.

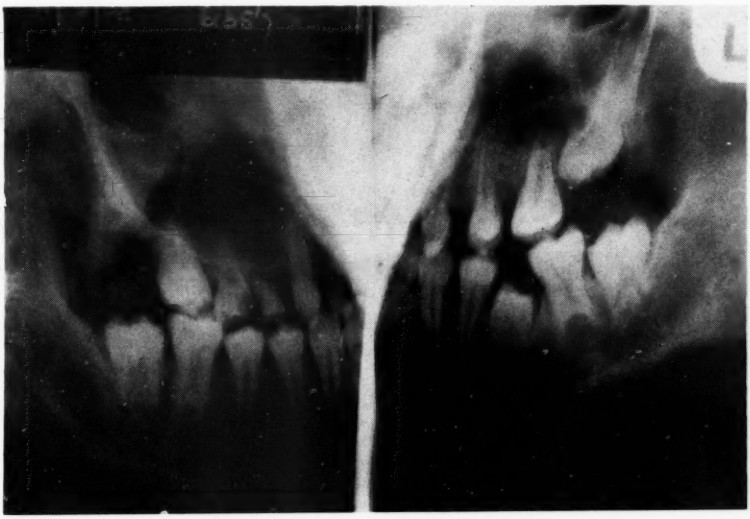

Fig. 3.—*Case* 1. Lateral jaw films—note shape of first molars.

9. $|\underline{6}$ to have a very constricted root formation for a first permanent molar; the $\underline{6}|$ to have a similar but less constricted root.
10. No sign of $\frac{87\ 54\ |\ 8}{8\ |\ 8}$ nor any sign of $|\underline{4}$ but this may have been extracted.

The whole picture is one of dental morphological abnormalities, which taking into account the small size of the $\underline{32}|\underline{23}$ and the absence of $\frac{87\ 54\ |\ 8}{8\ |\ 8}$ may be termed degenerate. The special feature is the extreme taurodontism of $\overline{6}|\overline{6}$.

Case 2.—P. C., male, aged 13. Referred for radiographic examination because of missing teeth.

On examination, $\frac{76E4\ B1|1B\ 4E67}{7\ 543\ |\ 345\ 7}$ were found to be present.

Radiographic Findings (*Figs.* 4 and 5).—

1. $\underline{1}|\underline{1}$—thick roots and large pulp cavity.
2. $\underline{\underline{32}}|\underline{\underline{23}}$ missing—congenitally absent.
3. $\underline{\underline{21}}|\underline{\underline{12}}$ missing and no history of extractions.
4. $\overline{6}|\overline{6}$ missing, possibly extracted.
5. $\frac{8|8}{8|8}$ missing.

6. $\overline{7|7}$—marked taurodontism—again the overall length of the tooth appears normal (*Fig.* 1 D).

7. $\underline{76|67}$—taurodontism, but to a lesser extent.

Again the picture is one of widespread morphological abnormalities of a degenerate type, with extreme taurodontism of $\overline{7|7}$.

Previous to this report very few cases of taurodontism in modern European man have been reported, that by Gorganovic-Kramberger (1909) (quoted by Lunt, 1954), and one by Lunt (1954) being the only two I can trace. Lunt's consisted of a single tooth extracted by a general practitioner, and no details are available of the patient's remaining dentition—it was a "casual extraction". The tooth itself,

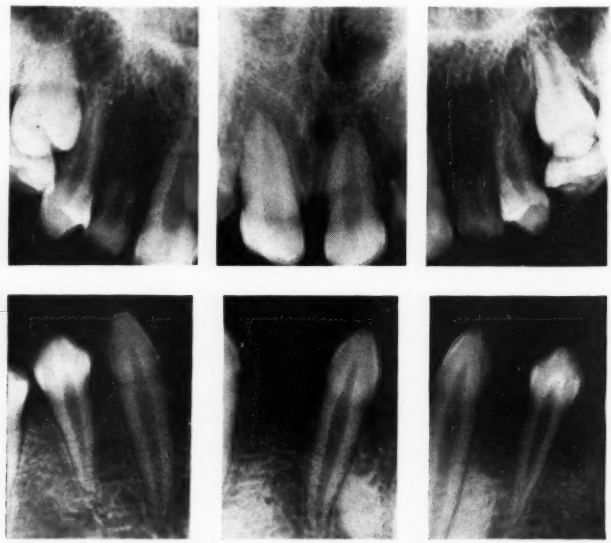

Fig. 4.—*Case* 2. Intra-oral films of anterior teeth—note shape of roots of the upper central incisors.

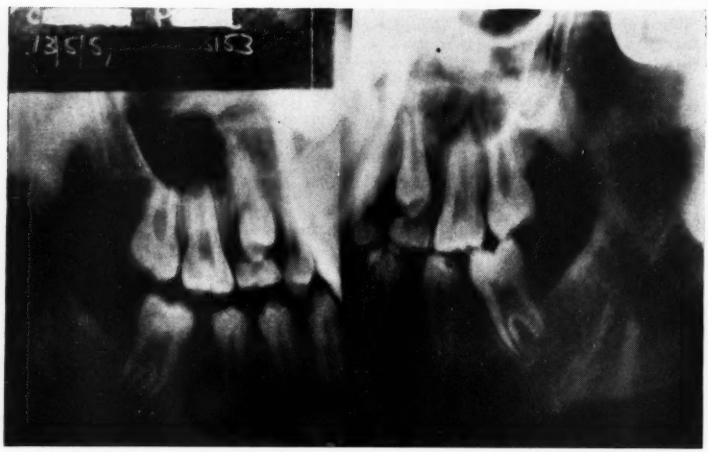

Fig. 5.—*Case* 2. Lateral jaw films—note shape of lower second molars.

a molar, is figured in the report, corresponds in overall length to a normal molar, and is the same general shape as the taurodontic lower molars shown in the present two cases; although it was studied histologically, because of delay in fixing the soft pulp tissue had degenerated to a few strands and no evidence was available of possible "internal resorption" to explain the size of the pulp. The size and shape of the pulp-chamber in the taurodont molar is more likely to be "primary" rather than "secondary"—the result of the abnormal functioning of Hartwig's sheaf, not of osteoclastic activity: in any case it is the external form that is important as the pulp chamber may, with age, become occluded to a greater or less extent by appositional dentine. As the molar teeth in the two present cases were symptomless they were not extracted, and hence no histological examination was possible.

It is interesting to note that taurodontism, but in a less extreme form, occurs frequently in Eskimoes and modern South African races; it would be helpful if more reports were available of its incidence in modern European races, together with any associated dental abnormalities. It is here that the general practitioner with his frequent radiographic investigations of the jaws can play his part.

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Influence of Injury and Adaptation of the Periodontal Ligament to Pathologic Changes during Experimental Lathyrism

Ninety-six male albino weanling rats were divided into groups and fed on various diets, all containing ground sweetpeas, plus protein, carbohydrates, and vitamin supplements.

It was found that lathyritic alterations were significantly influenced through a change in the proportion of dietary proteins and amino-acids.

It was suggested that the results of the investigation indicated that a search for carcinogenic and toxic compounds might be well worthwhile.—GARDNER, A. F. (1959), *J. Periodont.*, **30**, 253.

Closed Mouth Mandibular Nerve Block: A New Technique

The anatomy of the region is described and the point is made that the inferior dental, lingual, and long buccal nerves lie in loose connective tissue in the triangular pterygomandibular space.

For this technique a 2-in., 25-gauge needle is chosen. With the teeth in occlusion or only slightly apart, the cheek is stretched laterally and the needle inserted between the pterygomandibular fold and the coronoid process at the level of the gingival margins of the upper teeth. It may then be advanced for 1·5 cm. through the tissue of the pterygomandibular space, and between the medial pterygoid and the mandible. Some anæsthetic solution is injected as the needle is inserted through the tissue, the rest is deposited when the needle is at 1·5 cm.

Advantages claimed for the technique are simplicity, lack of trauma to muscles, nerves, and vessels, minimal discomfort for patient, and easy diffusion of the drug to the lingual, inferior dental, and long buccal nerves.—VAZIRANI, SUNDER J. (1960), *Dent. Dig.*, **66**, 10.

Xylotox Oral

THE Pharmaceutical Manufacturing Company have asked us to point out that the information given in last month's DENTAL PRACTITIONER re "Xylotox" Oral was not quite correct. To obtain anæsthesia of the palate and back of the mouth, a suitable amount (say one tablespoonful) should be sluiced about the mouth for one minute or more and then *spat out*; after a further three minutes full anæsthesia will be established. It is *not necessary* to swallow "Xylotox" Oral, although no harmful results will ensue if this occurs.

DEEPENING THE BUCCAL SULCUS AS AN ADJUNCT TO GINGIVECTOMY*

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THE primary object of gingivectomy is the elimination of periodontal pockets, but where the bases of these pockets are beyond the mucogingival junction, or where there are high muscle fræna, additional surgical procedures are necessary (*Figs.* 1–3). These procedures are also indicated when a shallow vestibule makes adequate tooth-brushing impossible.

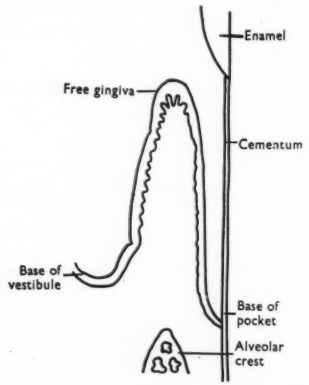

Fig. 1.—Schematic view showing the base of the pocket lying apical to the base of the vestibule.

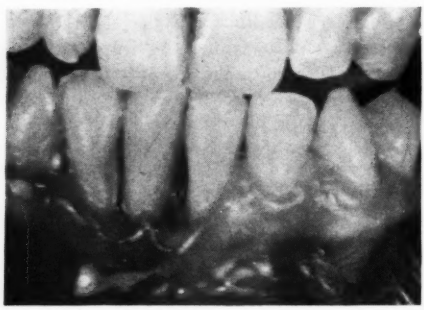

Fig. 2.—Bases of the pockets round $\overline{2|1|1}$ are apical to the mucogingival junction.

Three mucogingival surgical procedures have been advocated, either alone or in combination (Glickman, 1958). They are:—

1. Deepening the vestibule or buccal sulcus.
2. Broadening the zone of attached gingiva.
3. Frænectomy.

Aetiological factors, such as calculus and traumatic occlusion, should be eliminated prior to operation. Regional block anæsthesia is preferable, but if an infiltration route is chosen the fluid should be injected slowly to minimize distortion of the tissues.

DEEPENING THE VESTIBULE

Two vestibule-deepening procedures used in the surgical treatment of edentulous flat lower ridges can be modified for periodontal therapy. With these methods pocket elimination should be carried out on a subsequent occasion to avoid sloughing of the gingival tissue through interference with its blood-supply.

Fig. 3.—Well-marked, high muscle fræna.

In Gillies's method (Gillies, 1920) the vestibule is incised at its deepest point, deepened and widened by blunt dissection, and an autogenous epithelial inlay from the hairless inner aspect of the arm is inserted and held in place by a stent. This procedure, requiring the assistance of a plastic surgeon and involving

* Given at the meeting of the British Society of Periodontology held on January 11, 1960.

two operative sites, does not appear to give better results than the methods below.

Alternatively, an incision is made approximately 1·5 cm. from the base of the vestibule in the mucosa of the inner aspect of the lip (*Fig.* 4). The mucous membrane is then

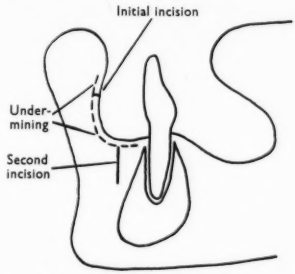

Fig. 4.—Schematic view of vestibule deepening method (*modified from Kazanjian*).

undermined on either side of the incision, forming two flaps. Having reflected the flap which is joined to the gingiva, a vertical incision 1·5 cm. deep is made, thus creating a new vestibule. The flap is then folded down, pressed against the bone, and is held in place by catheters and circumferential suturing (*Fig.* 5). To reduce the size of the raw area on the lip, the smaller flap is advanced as far as possible from the vermilion border and sutured in place (Kazanjian, 1924).

Kazanjian's method has been modified by Gottsegen as follows: The periodontal pockets are eliminated by gingivectomy and a vertical incision 1–2 cm. is then made at the base of the vestibule, extending laterally beyond the involved area by the width of one or two teeth. The incision should be deeper in the middle than at the extremities and is widened by blunt dissection (Gottsegen, 1954).

BROADENING THE ZONE OF ATTACHED GINGIVA

This procedure, by which the area of the attached gingiva is increased, has been named the "push-back operation". This relatively simple procedure has the advantage of combining pocket eradication with vestibular deepening.

A vertical incision is made at either end of the area to be deepened (*Fig.* 6). These incisions should extend from the gingival margins well into the muco-buccal fold (Ariaudo and Tyrrell, 1957). The interdental papillæ are incised mesiodistally and a mucoperiosteal

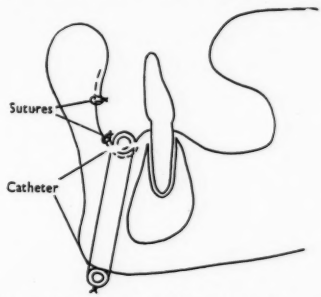

Fig. 5.—Schematic view showing catheters maintaining the depth of the deepened vestibule (*modified from Kazanjian*).

Fig. 6.—Vertical incisions have been made beyond the area shown in *Fig.* 2.

flap is reflected. A narrow strip, about 2 mm. wide, is then trimmed from the gingival margin with scissors. The flap is pressed firmly downwards with gauze and held for a few minutes until the blood has coagulated. Normally this is sufficient to retain the flap but it can be sutured in its new position. A normal gingivectomy is carried out on the lingual aspect. When operating in the lower premolar region, care must be taken to avoid the mental nerve.

FRÆNECTOMY

High muscle attachments occur most commonly between the mandibular and maxillary

central incisors but may complicate a gingivectomy in any area of the mouth. The frænum can usually be excised quite simply just before the gingivectomy, but the inferior labial frænum is often associated with a shallow vestibular trough. In these cases, the lower lip is stretched to exert tension on the frænum which is incised vertically near its gingival attachment, the incision being carried laterally to the limits of the shallow area and blunt dissection used to deepen and widen the incision (Gottsegen, 1954; Bork and Weiller, 1958).

Fig. 7.—New method of retaining vestibular packs.

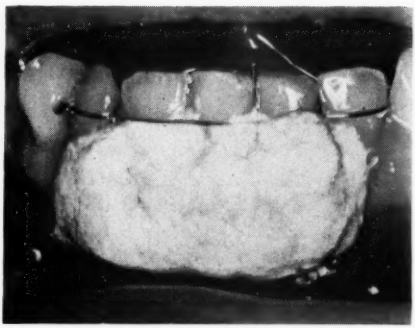

Fig. 8.—Showing vestibular pack in situ.

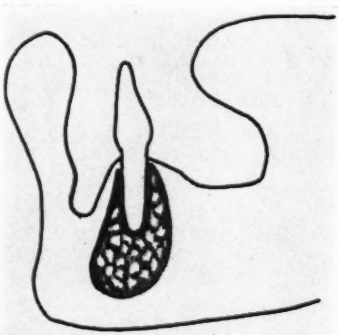

Fig. 9.—Schematic view showing ideal result. Note width of newly-created vestibule.

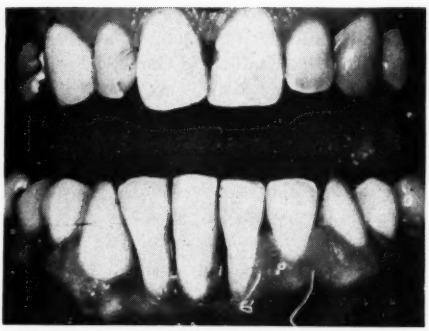

Fig. 10.—Appearance of case shown in *Fig.* 2 one month after vestibular deepening.

POST-OPERATIVE PHASE

Following all these operations the tissues must be retained in their new positions for at least ten days, and various methods of fixation have been devised. Catheters with extra-oral fixation were advocated by Kazanjian (1924). Alternatively, a catheter may be sutured in the base of the deepened vestibule itself (Archer, 1958). Blanquie (1958) described the use of Ward's Wonderpak. McKenzie (1951), Gottsegen (1954), and Trott (1958) used acrylic veneer splints, wired in place after inserting the pack. Goldman, Schluger, and Fox (1956) state that such splints are unnecessary as packs rarely fracture. If the veneer is made in pink acrylic, however, the æsthetics are improved.

Hirschfeld and Wasserman (1958) described a simple framework of floss-silk, or soft stainless steel wire, which has been modified by using a loop-wire splint with the interdental wires left abnormally long (*Fig.* 7) and bent into the vestibule. This provides rigid support

for an over-extended pack of either zinc-oxide and eugenol paste in cotton-wool or the asbestos-resin type (*Fig.* 8). Care should be taken to cover all wire ends, and after gently muscle-trimming the pack, petroleum jelly should be applied liberally. After bleeding has ceased and careful instructions on oral hygiene have been given, the patient is dismissed for seven to ten days. The pack is then removed, the area gently cleansed, and a fresh pack inserted. This is left for a further week before being removed. A third pack is rarely required. Gentle oral hygiene with finger massage of the operation area and hot saline mouth washes should be started immediately after removal of the final pack. Post-operative pain is only minor in degree and hæmorrhage is rarely encountered.

Fig. 11.—Appearance of case shown in *Fig.* 3 two months after frænectomy.

RESULTS

Even with firm packing, there is a tendency for muscle-tension to reduce the depth of the newly formed vestibule. This tendency persists after pack removal, but the vestibular floor rarely gains its original position. Incisions must be deep and adequately widened. Packs should be firm and oversize (*Fig.* 9).

Ivancie (1957) and Grant (1958) in histological investigations of gingival regeneration in vestibular surgery stated that after one week the area was covered by granulation tissue which over the subsequent three weeks was converted into immature gingival tissue with poor keratinization, low epithelial ridge formation, and poorly arranged collagen bundles. Thus, after one month, the tissue resembled mucosal rather than gingival epithelium (*Fig.* 10), but after six months biopsies showed regeneration of normal gingiva with a well keratinized surface and regular ridges. (*Fig.* 11.)

Acknowledgements.—I wish to express my thanks to Mr. A. Bryan Wade, of the Royal Dental Hospital of London, for his help and encouragement during the preparation of this paper and to Mr. Shilland, of that Hospital's Photographic Department, for the preparation of the illustrations.

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Cartilage and Bone-grafts in Supra-bony Pockets in Dogs

Considerable histological evidence is produced to show the value of cartilage and bone-grafts in the treatment of suprabony pockets which had been surgically created in dogs on the labial aspect of the maxillary canine teeth.

New attachment, up to 3 mm., was attained. There was evidence to show that bone-grafts, both autogenous and homogenous, had a greater stimulating effect than cartilage-grafts. A small degree of re-attachment was present on the control sites, which were subject to subgingival curettage alone.—SCHREIBER, H. R., HARDER, E. W., and THOMPSON, L. B. (1959), *J. Periodont.*, **30**, 291.

BOOK REVIEWS

TEXTBOOK OF ORAL SURGERY. Edited by GUSTAV O. KRUGER, B.S., A.M., D.D.S., F.A.C.D., Professor of Oral Surgery, Georgetown University School of Dentistry and School of Medicine, etc., Washington, D.C. $9\frac{3}{4}\times6\frac{3}{4}$ in. Pp. 573, with 489 illustrations. 1959. St. Louis: The C. V. Mosby Co. (London: Henry Kimpton.) 95s.

THE advent of a *Textbook of Oral Surgery* written by a panel of distinguished American oral surgeons, under the editorship of Professor G. O. Kruger, is an event of considerable importance to all those interested in the subject. The authors have followed the sequence in the teaching of oral surgery as advocated by the American Association of Dental Schools except that exodontia has not been dealt with in the belief that it is adequately covered elsewhere.

This work is intended for both the senior undergraduate student and those who intend to specialize in oral surgery as well as the general dental practitioner, who, particularly in parts of the world where oral surgical consultant aid is not available, may from time to time be compelled to undertake oral surgery of an advanced character. These purposes it admirably fulfils. Throughout, general principles are rightly stressed, but at the same time, adequate descriptions of techniques are given.

In considering the treatment of fractures of the jaws there are some differences in the procedures advocated, from those which are commonly taught in the United Kingdom. For example, in the emergency treatment of mandibular fractures it is stated that "the four-tailed bandage is one method that can be used", whereas in Britain this method is usually condemned, because of the danger of causing further posterior displacement of anterior fragments.

It is interesting to learn that in the United States there is now the tendency to use open reduction less than was commonly practised just after the Second World War and to resort to a more conservative approach comparable with that of oral surgeons in this country. Nevertheless, the method of silver cap splint construction described in this book is confined to the preconceived type, which is only used to-day in the treatment of fractures with no displacement of the tooth-bearing parts and the use of precision locks is completely ignored. The development of refinements in the construction and application of precision locks with silver cap splints has, in Britain, made comparatively simple the method of treatment of many fracture cases which in the United States would be dealt with by open reduction. This chapter on fractures of the jaws by Professor Kruger himself is, however, of special interest because of our different approach as far as techniques are concerned.

This work is well illustrated with diagrams, radiographs, and clinical photographs in monochrome, which assist in producing a clarity in presentation and which will commend the book to all. Whilst it contains more detail on some subjects than is required by the undergraduate student, nevertheless, it is the type of reference book which should be always available on the shelves of those who may be presented with oral surgical problems whether in general dental practice or in specialist work.

A. D. H.

ESSENTIALS OF REMOVABLE PARTIAL DENTURE PROSTHESIS. By OLIVER C. APPLEGATE, D.D.S., D.D.Sc., F.A.C.D., Professor of Dentistry (Partial Denture Prosthesis), School of Dentistry and W. K. Kellog Foundation Institute: Graduate and Postgraduate Dentistry, University of Michigan. Second edition. 10×7 in. Pp. 364+viii, with 453 illustrations, 10 in colour. 1959. Philadelphia and London: W. B. Saunders Co. 98s.

THE title of this volume is truly descriptive of the contents. As expected of a second edition, it is more comprehensive than the first. The method of presentation, the style, and the printing have all been changed, and the

number of illustrations increased. The effect has been to produce a book which is less dynamic but more mature—a book which will appeal less to the undergraduate but more to the general practitioner with a leaning to prosthetics, and to the specialist.

The first edition was presented mainly in short numbered paragraphs in a question and answer style, with numerous illustrations and long explanatory legends. The lists of references and acknowledgements were placed at the foot of each appropriate page which made them difficult to find on referring to the book unless one knew the contents very thoroughly.

The second edition, unlike its predecessor, is divided into two main parts. Part I, which is much the longer, is subdivided into chapters with much more briefly described illustrations, the substance being now in the text, and a full bibliography at the end of each chapter. Part II is continuous, much longer than the corresponding section of the earlier volume, and wider in scope with a new and commendable addition on clasp repair.

Part I deals with the "why's and wherefore's" of partial dentures. Every aspect from the detailed meaning of the words and terms used in describing partial denture work to the finished case is dissected and explained, clearly and carefully, with the minimum use of words and a wealth of knowledge.

Each material, every piece of apparatus required, and all component parts of partial dentures are examined systematically. Their uses, possible pitfalls and advantages are given in such a way that the reader understands the place and importance of each as the work proceeds in sequence through the surgery and laboratory stages of constructing removable partial dentures.

The vital tissues forming support for a partial prosthesis, the tissue denture relationship, and the question of the stability of the alveolus in use and in disuse are adequately discussed. The preparation of teeth as abutments, the stabilization of isolated teeth by fixed bridges so that they may serve as abutments for removable appliances, the equilibrium of occlusion to remove harmful stresses on the periodontium, and all the physiologic relations of the oral tissues to a removable partial denture are portrayed with knowledge and understanding.

References to previous statements and earlier illustrations are few, and the whole trend is a methodical progression to a finished case.

Part II, called "Clinical Procedure", again goes through the whole process of partial denture construction, but this time the accent is on how the work is done. There is therefore no feeling of irksome repetition, and Part II can be said to be complementary in every way to Part I.

The illustrations, which are mostly photographs, are well placed in relation to the text. In Part I they form a helpful background, but in Part II the text is the background to the illustrations, which says much for their clarity and continuity.

The technique described is exacting and time consuming, perhaps too time consuming for the average remuneration rate in this country, but most dentists could find much to adopt and advantageously adapt to their own methods.

Altogether this is a well-written and well-produced volume which would be an asset to any dental practitioner.

R. V. P. C.

PRACTICAL ORAL SURGERY. By HENRY B. CLARKE, jun., M.D., D.D.S.; Chairman, Division of Oral Surgery, School of Dentistry, University of Minnesota; Head, Hospital Dental Service, University of Minnesota; etc. Second edition. $9\frac{1}{4} \times 6$ in. Pp. 469, with 279 illustrations. 1959. Philadelphia: Lea & Febiger. (London: Henry Kimpton.) 71s. 6d.

THIS is a comprehensive survey of the whole field of oral surgery and also includes some procedures which in this country would be dealt with by the plastic surgeon. There is an immense amount of detail about the procedure for admitting patients to hospital, scrubbing up, history taking, ethics, and fees, and although much of this differs from practice in this country it is all very readable and

is particularly useful for the undergraduate. Thoroughness has perhaps been carried to unnecessary lengths by including "vocabularies of terms" in four of the sixteen chapters.

The descriptions of techniques are clear and illustrated by good diagrams and photographs, but only forty pages are devoted to fractures of the jaws and this section is disappointing. The chapter on congenital and developmental defects is too brief to be of value to the specialist, but gives an interesting account of some methods of treatment of clefts and prognathism. The author describes alternative methods of treatment of various common conditions and his discussions of their merits are well balanced and helpful.

There are some useful notes on antibiotic therapy and a short chapter on drugs, many of which have trade names unfamiliar in this country.

The book is excellently produced, stimulating to read, and although many techniques described are different from those used in this country it can be recommended as a valuable work of reference for the general practitioner.

A. S. P.

ABSTRACTS FROM OTHER JOURNALS

Dentinal Dimensions of Primary Teeth

Measurements were made of the thickness of dentine from the dentino-enamel junction to the pulp on a large number of deciduous teeth. The data showed little variation in the measurements among homologous teeth. The information could therefore be applied to cavity preparation. Teeth were fixed, decalcified, and cleared. They could then be cut with a razor and measured. The measurements emphasize how remarkably thin the dentine may be in places in deciduous teeth.

A large amount of data is presented and many pertinent comments are made on cavity preparation in the light of this study.—ARNIM, SUMTER S., and DOYLE, MILLARD P. (1959), *J. Dent. Child.*, **26**, 191.

Radicular Cyst associated with Epithelium in a Root Canal

A girl of nine years had a large painless cavity with an exposed and evil-smelling pulp in $\overline{6}$. After extraction the tooth and the 6-mm. spherical mass of soft tissue associated with the mesial root were sent for microscopical examination. The lesion was found to have the appearance of an infected radicular cyst. Viable soft tissue extended along the root canal from the apical foramen to within 1 mm. of the floor of the pulp chamber; serial sections were required to demonstrate this continuity. The soft mass of loose fibrocellular connective tissue contained many dilated, thin-walled blood-vessels. The surface of the connective tissue adjacent to the dentinal walls was covered by a layer of epithelial cells varying from 2 to 10 cells in thickness. The distal root canal contained connective tissue with inflammatory cells but no epithelium. Since the apex had not been fully formed at the time of pulp exposure and death, the epithelium probably originated from Hertwig's sheath.—MCDOUGALL, W. A. (1959), *Aust. dent. J.*, **4**, 331.

The Effect of Physiologic and Pathologic Process upon Certain Histochemically Detectable Substances in the Gingiva

Histological examination of 148 specimens of marginal and attached human gingivæ, obtained from 74 male and female subjects between the ages of 10 to 81 years, revealed an inverse relationship between the occurrence of glycogen in the epithelium and surface keratinization. Keratinized material contained less P.A.S. positive polysaccharide than parakeratinized structure. Keratinization increased and glycogen decreased with age. No sex difference was found.

Glycogen, protein-bound sulphydryls, and amino groups and ribonucleic acid were increased in the epithelium in areas of hyperplasia, associated with inflammation.—TURESKY, S., GLICKMAN, I., and FISHER, B. (1959), *J. Periodont.*, **30**, 116.

GENETICS AND CLINICAL RESEARCH

By **H. KALMUS, M.D., Sc.D.**

I AM greatly honoured by your invitation to deliver the Northcroft Lecture, 1959. I suppose the invitation to do so was extended to me in full knowledge of my complete innocence as far as orthodontics is concerned, possibly with expectations that I might provide some amusement. However, by choosing my theme near my main interest which is genetics, I hope to be on reasonably solid ground. When approaching your special interests, which I can only do to a limited extent, and by way of an example, I shall also touch another of my interests, namely, the study of behaviour.

Some of you may have attended a lecture by Professor Grüneberg in 1949 (Grüneberg, 1950), on a theme similar to mine, and may notice a certain overlap in our treatment. Nevertheless, so much has happened in the last decade that my lecture may be justified.

A few words concerning contemporary genetics may be in order. Some thirty years ago genetics appeared to most outsiders as a rather static discipline of a severely formal type in which living organisms were represented by mathematical symbols. Genes seemed to be immutable and permanent like the atoms a hundred years ago. And this study appeared highly academic and almost irrelevant to the pursuits of doctors and research workers, who just then were most successfully engaged in gaining control of such environmental forces as the infectious agents or the vitamins. The situation has now changed rather radically: mutation, whether spontaneous or induced by radiation or chemicals, has transformed genetics into a dynamic science. The biochemical nature of gene action has brought our science into the centre of contemporary physiology and the very mathematics of population genetics have become alive and concerned with evolutionary changes. At the same time the successes of environmental manipulations by the doctor have demonstrated the existence of numerous genetical conditions which must be approached in a novel way. In addition, there are such striking novel discoveries, showing that mongolism and Klinefelter's and Turner's syndromes are caused by chromosome anomalies; or that leukæmia may show somatic chromosomal aberrations.

The relations between genetics and clinical research, which are of many kinds and fairly complex, can be unravelled in different ways. Considering them as relations between people trained in different disciplines, we might, for instance, ask in what way can geneticists and clinicians co-operate in their pursuits. In the medical, dental, or veterinary curriculum genetics are taught only in the pre-clinical and sometimes even in the pre-medical phase of instruction, usually by a non-geneticist, for instance by an anatomist or physiologist, zoologist or botanist, who, though he may have some sound knowledge of the fundamentals of Mendelism, can by the nature of things have but little first-hand clinical experience. Thus there is need to supplement such fundamental instruction later in the curriculum, for instance in the pathology course or some clinical courses; if the teachers concerned feel diffident about their genetical knowledge they should call in a human geneticist to give a few lectures. If these are properly integrated they can provide the basis for prolonged co-operation, to the ultimate benefit of the patients. From the geneticist's point of view co-operation with the practitioners of medicine or dentistry is, of course, most valuable, as they are the foremost source of the material for his studies. But the doctors can also profit; busy clinicians have little time and their genetics tend to become rather obsolete; also they may sometimes not realize to what extent genetical investigation may help in their diagnosis, therapy, and counselling.

One way in which doctor and geneticist may co-operate is to use hereditary conditions in

The Thirteenth Northcroft Memorial Lecture given at the meeting held on November 9, 1959.

animals as models for similar human conditions (Grüneberg, 1947). Obvious advantages of such a procedure are that one can manipulate the breeding of animals, producing large numbers of "patients"; that one can investigate the individuals in many ways in which one cannot handle humans, and that one can kill them; another great advantage is that a stock of laboratory animals usually contains only one and the same hereditary condition, which means that one is dealing with a "pure" disease. One can rarely be sure of this in clinical investigations. Anomalies like pigmentary defects, skeletal malformations, muscular dystrophy, and endocrine disturbances have been profitably studied in animals. In the end, of course, such studies must revert to man.

In other cases, direct and immediate studies of hereditary conditions in man are often more advantageous and, in fact, sometimes the only possible way. This is fairly obvious in conditions affecting mental aptitudes and other higher faculties. But it also applies to such conditions where biochemical analysis is furthest advanced in man or where rather larger amounts of material are needed for research than can be conveniently provided by the smaller laboratory animals. Finally, the population aspects of genetics are best studied on human material as demography and case histories provide more detailed information on great numbers of people than are available for individuals of any other species.

Clinicians are interested in diagnosis, aetiology, prognosis, therapy, and prevention, and I think that this audience might like to hear some ideas of a geneticist concerning these five points.

DIAGNOSIS

Most, but not all, genetical diseases are characterized by familial occurrence, either in successive generations or in sibships. But infection or malnutrition can, of course, also run in family groups and on the other hand

Table I.—Time and Factors which might affect a Clinical Condition of an Adult

Time:	Before conception	During meiosis and fertilization	Embryonic period	Fœtal period	During birth	Childhood and adolescence
Factors:	Gene mutation in germ plasm of parents or earlier ancestors	Chromosomal anomalies: loss, non-disjunction, translocation, unbalanced recombination	Maternal physiology (age), infection, rickets	Uterine infection; Maternal–fœtal incompatibility	Birth injury	Diet, infection, accidents, social condition, medical treatment

dominant mutants causing death or sterility are not likely to spread. Therefore, other additional criteria must be frequently used: for instance definite Mendelian ratios, in all dominants or recessives; consanguinity in rare recessives; sex linkage in sex-linked recessives, like hæmophilia or osteochondrodystrophy (Morquio's disease); paternal age at conception in lethal or sublethal dominants. Heterogeneity of the clinical material, imperfect manifestation, difficulties of selecting adequate control groups, the existence of phenocopies, i.e., non-genetical mimics of hereditary conditions, must frequently be taken into account (Kalmus, 1957). In spite of these difficulties and several others which make human genetics a rather forbidding subject, new human hereditary conditions are being constantly discovered, especially in the biochemical field and in serology.

AETIOLOGY

The idea that diseases need not always be caused by extraneous agents, such as bacteria or trauma, but may be traceable to a faulty blue-print for development, or as we would now say to faulty genetical information, was

first clearly conceived by Garrod (1908), who applied it to the inborn errors of metabolism. But it applies equally to the development of malformation or to defective higher functions.

It should, perhaps, not be necessary to mention that the terms hereditary and congenital are neither synonymous nor interchangeable. The first refers, as just mentioned, to a faulty plan, the second to the fact that a condition becomes visible immediately after birth. *Table I* illustrates the phases of life at which various noxious agents may cause disease.

PROGNOSIS

Many doctors are inclined to consider hereditary diseases as particularly intractable and almost beyond the scope of therapy. Now, it is true that a fault in the construction of a machine might be so fundamental as to be incurable; but so is many a breakage. On the other hand, it is often possible to offset some defects in construction, for instance by special manipulation or by reducing the strain. Thus we might guess that there is no intrinsic reason why therapeutic measures should not succeed in many hereditary conditions—as indeed they have in diabetes or cataract—and that our relative impotence in the field is mainly due to previous neglect.

THERAPY

An ideal therapy of a disease caused by a mutant gene would, of course, be the removal of this gene from every nucleus of the patient's somatic and germ cells and its substitution by the normal allele; alternatively one could try to "repair" the gene. I should say such procedures are unlikely ever to succeed. Therefore, palliative therapeutic measures must be resorted to. We have already stated our opinion that ample scope exists in this direction.

PREVENTION

One can try to prevent genetical disease on the levels of the individual or of the population. Early diagnosis will sometimes enable the doctor to prevent the damage which a genetical situation would otherwise cause. In this, genetical knowledge may be of considerable help. An example is erythroblastosis fœtalis, the dangerous jaundice of the newborn usually caused by maternal–fœtal incompatibility. If one or several births of a woman have produced jaundiced babies, one should—after serological investigation—be prepared for speedy blood transfusion after any subsequent delivery. Thousands of lives have already been saved in this way. Perhaps it should be mentioned that these children are not by any stretch of imagination pathological. They are Rhesus-positive (most of them carry the gene D), as is the majority of mankind; their misfortune is that they are borne of Rhesus-negative mothers, who themselves do not show any sign of disease either.

The prevention of genetical disease in populations is a difficult and thorny problem. We might distinguish between the appearance of new deleterious mutants and their spread. Very likely mutations of many kinds occur all the time at rather low frequencies. It is possible that their rate is increased locally or by certain new man-made agencies. But, as yet, we know rather little about the effects of radiation and chemicals on human mutation rates, except that they are difficult to discover.

Methods devised to limiting the spread of existing noxious genes may be called "negative eugenics". They are but rarely applicable or effective. The proposition usually is in the nature of spilling the child with the bath water, i.e., one tries to remove the disease with its carrier be it by killing, aborting, or sterilizing. Slight hereditary defects will not easily induce a doctor to such drastic measures, and genes causing severe defects will, as a rule, either be self-eliminating (when dominant) or inaccessible (as in recessives), where the majority of the genes is carried by normal heterozygotes and their presence usually cannot be ascertained with certainty.

I have so far tried to draw the outlines of human genetics and their clinical application. You may ask whether any of these have a bearing on orthodontics. I should think connexions exist and thus will discuss part of this your field, namely certain types of malocclusion.

[My feelings in this venture may, perhaps, be compared to those one of you might experience if called upon for the first time to perform some jaw operation on a lion. You would probably tell yourself that everything is likely to proceed quite orderly and politely, and you might think of the reasonable fee for your efforts. On the other hand, an apprehension of certain disagreeable possibilities is bound to well up in your mind. Now I do not want to exaggerate by adding to the fearfulness of my situation except by saying that most of what I am going to say will look at me from the printed page, and that can be a very cold stare.]

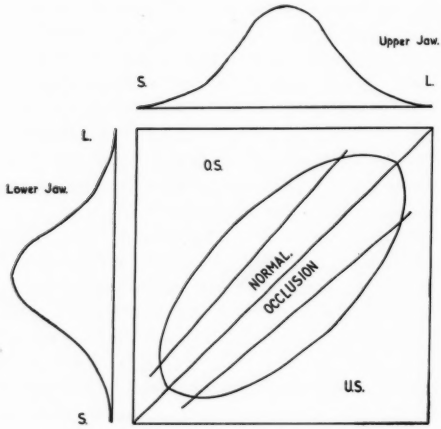

Fig. 1.—The lengths of the jaws of people in relation to dental occlusion.

Let us make a start by considering what we mean when calling a person or condition "normal".

The word "normal" is used in everyday language, and has a great variety of meanings. It is, perhaps, most widely used in the medical sense, when it means "not ill". Doctors have for centuries tried to define normality more positively, but it still remains a rather negative concept. In law, too, a concept of normality is used which may be equated to some extent with sanity or responsibility for one's actions. Another aspect of normality is the statistical one; a normal or average person defined statistically will fall in certain of his measurable characters between arbitrary limits on both sides of the most frequent value, that is, within the "normal range". Ever since Quetelet introduced the term "L'homme moyen", the "average man" has haunted public life and social science. Yet another application of the word "normal" has at times considerably confused some members of the medical profession. That is, in the term "normal distribution", the usage of which should be discouraged in favour of the term "Gaussian or Bell-shaped distribution". But, as always, when one talks about populations and measurements this aspect, too, will enter our discussion.

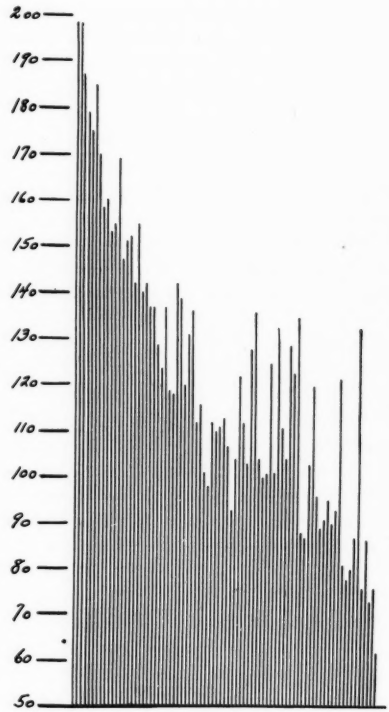

Fig. 2.—The ordinates represent the mandibular lengths of the skulls of dogs, which are arranged in descending order of palatal length. The correlation though positive is quite imperfect. (*From Stockard and others*, 1941.)

I should now like to try to show how to study malocclusion, making a start from the normal situation. If normal occlusion consists in an efficient and convenient relative position of upper and lower teeth, we may assume that the length of any upper jaw and of the corresponding lower jaw must be such that, within the limits of mobility and of comfort, such a position can be maintained. On top of *Fig.* 1 you see a hypothetical Gaussian distribution of some measurements of length of upper jaws and on the left a similar distribution of the lengths of the corresponding lower jaws. [I can quote a paper on how to measure isolated mandibles, namely one by Morant, 1936, but none on how to measure upper jaws or how to make measurements in the living.] Let us now consider what would happen under two extreme conditions. If the effective lengths of upper and lower jaws were always the same we should get perfect correlation (correlation coefficient = 1, as originally defined by K. Pearson at University College). In this situation the points, the x and y's of which represent upper and lower jaw length, would fall in the diagonal and there would be no malocclusion.

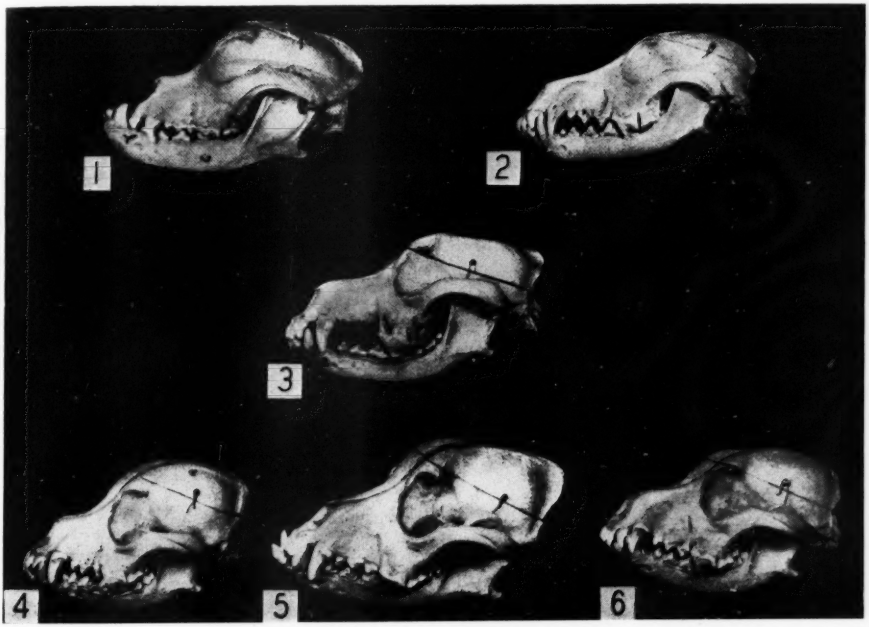

Fig. 3.—Crosses between a French bulldog (1) and a dachshund (2). The F_1 generation (3) shows almost normal dental occlusion, but overshot (6) as well as undershot (5) and near normal occlusion occurs in the F_2. (*From Stockard and others*, 1941.)

If, on the other hand, there would exist no correlation between the lengths of maxillæ and mandibles, these points would be all over the place and a considerable number of mouths would fall outside the limits set to normal occlusion.

In reality a fairly high, but not absolute, correlation exists between the lengths of the jaws and the points in *Fig.* 1 will mostly fall within an ellipse as indicated; and as a consequence the number of malocclusion mouths is comparatively small. Measurements on those lines have been done on dogs (Stockard and others, 1941; *see Fig.* 2) but have not to my knowledge been published for man.

They would provide information on what one could call "normal occlusion and its aberrations".* Genetically one might suppose that such a situation would be the result of many small and unequal genetical and environmental effects on the growth of both or either jaw (polygenic inheritance); the extreme misfits would then be the outcome of random combinations, and no clear Mendelian distribution would be discoverable in the families and relatives of such people. Eugenic prevention in such cases would be quite impracticable.

Segregation would, however, be expected in all cases where a single genetical difference greatly interferes with the growth of either jaw or of both. Many relatives of a person affected in this manner will have abnormal bites and they would all either have undershot or overshot mouths.

Human families containing members with grossly overshot jaws and others with grossly overshot ones must be rather rare. In dogs (*Fig.* 3), however, litters have been described, mostly in the second filial generation of greatly divergent and rather pathological breeds, which contain a high proportion of undershot and of overshot individuals, indicating, as is thought, a generalized developmental disharmony. One might suppose that such disharmony occasionally occurs in humans in the offspring of two individuals carrying different genes which greatly affect the growth of jaws; but there is no human race corresponding to the bulldog or the basset hound on the one hand, and the alsatians, whippets, and similar breeds on the other hand (*Fig.* 4), and comparable human crosses must be rare; and as most human populations are predominantly composed of well-occluded people, hybrids will, as a rule, not show malocclusion either.

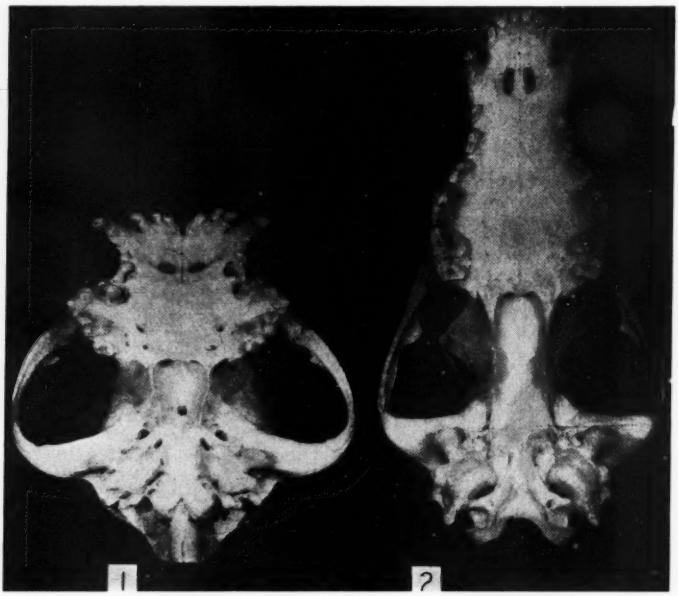

Fig. 4.—Skull bases of an English bulldog (1) and a German shepherd dog (alsatian). In the greatly shortened maxilla of the bulldog the premolars stand crosswise. (*From Stockard and others*, 1941.)

* This descriptive name is taken from a similar study on emmetropia (Sorsby, Benjamin, Davey, Sheridan, and Tanner, 1957).

As most of you will be very familiar with cases of malocclusion in your patients I will not bore you with such examples, but, instead, discuss a few cases of this condition in various animals (*Table II*).

Until now I have dealt with the various instances of malocclusion as if they were entirely a matter of bone growth and quite independent of innate posture patterns (Gesell, 1942, 1954), of oral habits, and their individual development. Now as Ballard (1956, 1957) has pointed out, attempts at changing the innate behaviour and posture patterns of the mouth are alone quite ineffectual

Table II.—Hypothetical Sequence of Events affecting Various Kinds of Malocclusion

Genetical Situation	First Discernible Gene Effect	Sites	Secondary Effects	Effect on Jaws	Position of Teeth	Species	Author
"Screw tail" a recessive autosomal gene	Probably general mesodermal growth deficiency of axial skeleton, etc.	Axial skeleton, skull, jaws, teeth	Many, generalized severe, stunted animals	Shortening of ramus of mandible	Lower incisors greatly backwards. Tend to curl up	*Mus musculus*, etc. (mouse)	MacDowell, Potter, Laanes, and Ward (1942)
Homozygous autosomal lethal	Anomaly of cartilage	Nose, snout, trachea, thorax, etc.	Many, generalized severe, stunted animals	Upper retarded (undershot)	Incisors edge-to-edge, or lower in front instead of upper in front	*Mus norvegicus* (rat)	Grüneberg (1938)
Several alleles, one semi-dominant	Perhaps chondrodystrophy	Head, long bones, spine	Hydrocephalus ? Many others	Shortening of upper	Upper incisors in front of lower ones	*Oryctolagus cuniculus* (rabbit)	Schnecke (1941)
Homozygous autosomal recessive	Unknown	Jaws and teeth	Smaller teeth	Retardation of frontal part of mandible, apparent lengthening of upper jaw (overshot)	Upper incisors and canines in front of lower corresponding teeth	*Canis familiaris* (dachshund)	Grüneberg and Lea (1940)
F_2 dachshund × French bulldog	Disharmony of genom	Endocrines, skeleton, others	Many, generalized	Overshot or undershot	Very variable	*Canis familiaris* (cross)	Stockard and Johnson (1941)
Unknown	Unknown	Maxilla	Not conspicuous	Maxillary neck "crowded"	Prominent upper incisors	*Homo sapiens* (man)	Numerous authors in dental literature (also other tooth anomalies)
Different genes, also possibly dominant ones	Unknown	Mandible	Not conspicuous	Undershot			
Unknown	Unknown	Neural or soft tissues	Open lip posture	Undershot			Ballard (1957)

therapeutically, though they may help after surgical or prosthetic treatment. That does not mean that certain habits, such as thumb- or finger-sucking, may not aggravate anomalies of dental position. But they do not by themselves cause those anomalies, as is shown by the fact that only a minority of thumb-suckers show malocclusion and not all malocclused children suck their thumbs or fingers. On the other hand, innate posture may apparently set a limit to the range inside which normal occlusion can be achieved in spite of a disparity of the jaws. The extent of this range and the acute and genetical factors which control it are, however, to my knowledge unknown and could provide interesting objects for study, and so can the oral habits in general.

I have come to the end of my discourse. The problems of orthodontics are usually studied by what is sometimes called longitudinal approach. If I have persuaded you that there might be some profit in extending your interest even beyond the life-span of your patients and "latitudinally" even to their families, I shall be well contented.

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Aetiology of Static Bone Defects of the Mandible

The literature concerning the bony cavities situated near the angle of the mandible, and first described by Stafne in 1942, is reviewed.

A number of patients have by now been explored with varying results. In one case the contents of the cavity were of the nature of a connective tissue dysplasia. In several the cavities were apparently empty, but in others a lobule of salivary gland was discovered, sometimes obviously connected to the submandibular salivary gland. A further case is reported in which a 60-year-old man was found, at operation, to have a lobule of salivary gland tissue in such a cavity.

It is suggested that in those cases in which the cavity was reported as empty the lobule of gland had slipped out of its bed and was consequently overlooked. The explanation of these cavities as being due to an inclusion of a lobe of the submandibular salivary gland within the mandible is accepted. The term "developmental sub-maxillary gland defect of the mandible" is suggested as a label for this entity.—CHOUKAS, N. C., and TOTO, P. D. (1960), *J. oral Surg.*, **18**, 16.

Reduced Radiation for an Orthodontic Survey

A technique using a 90 K.V.P. machine, high speed screens, and ultra-fast film is described. A scheme for examining orthodontic patients cephalometrically and with lateral jaw and occlusal films is suggested. In this way the calibrated roentgen dose is 0·214 r.—COHEN, M. I. (1958), *Amer. J. Orthodont.*, **44**, 513.